Robotics – Exercise 4 – Red Team Report

Shlomi Ben-Shushan ID: 311408264
Yiftach Neuman ID: 208305359

Summery

In this report we will explain our implementation of the Red Team, that helped us to test, improve and evaluate our blue team algorithm.

Algorithm Description

General Strategy:

Wander the arena by driving straight until you find food or bumped into something. If you find food, continue wandering in a similar way, but if you sense base's color, drive towards it. If you bumped into something, make a hard-turn. Although this is a simple strategy, it made good results and it is not completely naïve because of the base's color sensing.

Sense: in this section we will describe our usage in the robot's sensors.

1. **RGBA Cameras:** the forager uses the 5 not-rear RGBA cameras to sense colors
2. **Bumpers:** the forager uses the three bumpers in its from to sense collisions.

Interpretation: in this section we will describe the interpretation of the sensing data.

1. **Nest Ahead:** when the front RGBA camera senses team base's color.
2. **Nest to the Right:** when the right or the right-front RGBA cameras senses team base's color, and the nest is not ahead.
3. **Nest to the Left:** when the left or the left-front RGBA cameras senses team base's color, and the nest is not ahead.
4. **Bumped into something:** when one of the front bumpers is pressed.

Action: In this section we will describe each forager state we have defined, and the behavior of the robot (the actions it will take) in each of the state.

1. **Move:** drive straight until:
   a. Found food → Switch to **RTB** state.
   b. Bumped into something → make a random **turn** (only hard-turns supported).
2. **RTB:** drive straight until:
   a. Food dropped → Switch to **Move** state.
   b. Nest (or base) nearby → Drive towards it.
   c. Bumped into something → make a random **turn** (only hard-turn supported).
3. **Turn:** drive with angular speed only until:
   a. Turning timer → Switch to **RTB** state if holds food, and to **Move** otherwise.

Setup() Pseudo-Code: Register robot with `writeTeamColor()` function, define team, base, and opponent colors, w.r.t `foragingMsg.outColor` value, and start sand-timers.

Loop() Pseudo-Code: Read sensors, interpret sensing data, and behave according to the current state, as described above.

Blue vs. Red Report

The following table describes the results of various experiments we performed in which we let the Blue Team (original forager implementation) compete with the Red Team so that we can evaluate the Blue Team performance.

ticks	10,000 clock-ticks			100,000 clock-ticks			1,000,000 clock-ticks		
seed	Blue	Red	Winner	Blue	Red	Winner	Blue	Red	Winner
1	24	22	Blue	211	189	Blue	1019	899	Blue
2	19	22	Red	181	175	Blue	1455	1434	Blue / Tie
3	18	24	Red	199	193	Blue	1457	1350	Blue
4	18	13	Blue	182	138	Blue	835	695	Blue
5	28	22	Blue	225	188	Blue	882	833	Blue
6	24	19	Blue	189	174	Blue	1280	1135	Blue
7	27	20	Blue	181	185	Red	780	762	Blue / Tie
8	23	21	Blue	201	165	Blue	1027	839	Blue
9	17	14	Blue	179	157	Blue	1072	906	Blue
10	26	16	Blue	159	153	Blue	1067	999	Blue
11	15	18	Red	224	184	Blue	1048	997	Blue
12	22	21	Blue	204	173	Blue	937	912	Blue
13	17	11	Blue	193	129	Blue	1072	875	Blue
14	22	16	Blue	186	153	Blue	798	721	Blue
15	15	16	Red	193	171	Blue	560	528	Blue